04. Variance component estimation via ANOVA

Quantitative Genetics Exercise, Universität Potsdam, Dr. Hao Tong

1. Given three factors A, B and C for a three-way ANOVA. Please write the expected mean squares including main effects and all interactions in the scenario that (*i*) factor A, B and C are all random effects, (*ii*) factor A is fixed, B and C are random effects.

2. Read the data "Ex4_1.csv", consisting of the yield measurement of three inbreed lines (assume all genotypes are independent and without pedigree information) in two environments. Please estimate the genetic variance component, environmental variance component, and genetic and environment interaction variance component, respectively. Which factor is significant at the α level of 0.01? How to calculate the corresponding F-value of each factor? (Hints: do not use function *lmer()*, please use ANOVA for estimation)

3. Read the data "Ex4_2.csv" for the nested mating design. Please estimate the variance component of sire, dame nested in sire. Which factor is significant at the α level of 0.01? How to calculate the corresponding F-value of each factor? (Hints: do not use function *lmer()*, please use ANOVA for estimation)